

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

### AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application:

Claim 1. (Currently Amended) A liquid crystal display element, comprising:  
a front side substrate having a front side electrode,  
a rear side substrate having a rear side electrode, and  
a liquid crystal layer interposed therebetween,  
wherein the liquid crystal layer is a chiral nematic liquid crystal layer comprising  
a nematic liquid crystal, and  
an amount of chiral dopant sufficient to provide reflection of visible light, and  
wherein the liquid crystal layer ~~that~~ exhibits a plurality of display states;  
wherein a display state is changed by a voltage applied across the electrodes, and at  
least one state among the display states is maintained stably,  
wherein the liquid crystal display element being characterized in that at least a part of  
the front side electrode and the front side substrate is transparent;  
wherein the front side electrode or the rear side electrode is divided into a plurality of  
electrode regions on its substrate surface so as to form pixel portions and interline portions,  
wherein the liquid crystal in said interline portions remains in a focal conic state, and  
wherein the maximum space  $a$  ( $\mu\text{m}$ ) between adjacent electrode regions and the  
thickness  $d$  ( $\mu\text{m}$ ) of the liquid crystal layer satisfy a relational formula of  $1.0 \cdot d \leq a \leq 4.0 \cdot d$ .

Claim 2. (Currently Amended) A liquid crystal display element, comprising:  
a front side substrate having a front side electrode,

a rear side substrate having a rear side electrode<sub>1</sub> and  
a liquid crystal layer interposed therebetween<sub>1</sub>  
wherein the liquid crystal layer is a chiral nematic liquid crystal layer comprising  
a nematic liquid crystal<sub>1</sub> and  
an amount of chiral dopant sufficient to provide reflection of visible light<sub>1</sub> and  
wherein the liquid crystal layer that exhibits a plurality of display states;  
wherein a display state is changed by a voltage applied across the electrodes, and  
wherein at least one state among the display states is maintained stably,  
wherein the liquid crystal display element being characterized in that at least a part of  
the front side electrode and the front side substrate is transparent;  
wherein the front side electrode or the rear side electrode is divided into a plurality of  
electrode regions on its substrate surface so as to form pixel portions and interline portions,  
wherein the liquid crystal in said interline portions remains in a focal conic state;  
wherein the maximum space  $a$  ( $\mu\text{m}$ ) between adjacent electrode regions, the thickness  
 $d$  ( $\mu\text{m}$ ) of the liquid crystal layer, and the maximum effective voltage  $V_{\text{max}}$  (V) of a voltage  
applied to the front side electrode and the rear side electrode satisfy a relational formula of  
 $1.0 \cdot d \leq a \leq d \cdot V_{\text{max}}/10$ .

Claim 3. (Original) The liquid crystal display element according to Claim 2, wherein  
 $V_{\text{max}}$  is 48 V or less and  $2.5\mu\text{m} \leq d \leq 6.0\mu\text{m}$ .

Claim 4. (Withdrawn) The liquid crystal display element according to Claim 2,  
wherein at least a part of the front side electrode comprises a plurality of segment electrodes,  
and the rear side electrode is a single common electrode arranged so as to correspond to all

the segment electrodes, or the rear side electrode is a plurality of common electrodes arranged so as to correspond to each plurality of segment electrodes.

Claim 5. (Original) The liquid crystal display element according to Claim 2, wherein at least a part of the front side electrode is stripe-like electrodes and at least a part of the rear electrode is stripe-like electrodes, said stripe-like electrodes of the front side electrode and the rear side electrode being arranged so as to be crossed in the substrate plane.

Claim 6. (Original) The liquid crystal display element according to Claim 5, wherein the disposition density  $L_d$  (number/mm) of the stripe-like electrodes is  $2 \leq L_d \leq 15$ .

Claim 7. (Withdrawn) The liquid crystal display element according to Claim 4, wherein the rear side electrode is a reflective electrode.

Claim 8. (Original) The liquid crystal display element according to Claim 5 wherein the rear side electrode is a reflective electrode.

Claim 9. (Withdrawn) The liquid crystal display element according to Claim 2 wherein a voltage pulse having a pulse width  $T$  (ms) of  $10 \text{ ms} \leq T \leq 1000$  is applied to the liquid crystal layer.

Claim 10. (Currently Amended) A liquid crystal display apparatus, comprising:  
the liquid crystal display element described in Claim 2,

wherein, when a segment display and/or a dot matrix display is carried out, figures and characters are displayed.

Claim 11. (Withdrawn) The liquid crystal display apparatus according to Claim 10, which is used for a public display apparatus.

Claim 12. (Withdrawn) The liquid crystal display apparatus according to Claim 11, wherein a price of an article and/or time is displayed.

Claim 13. (Withdrawn) The liquid crystal display apparatus according to Claim 10, which is used for a display apparatus for a vehicle.

Claim 14. (Withdrawn) The liquid crystal display apparatus according to Claim 13, wherein a speed of a vehicle and/or time is displayed.

Claim 15. (Withdrawn) In a liquid crystal display element comprising a front side substrate having a front side electrode, a rear side substrate having a rear side electrode and a liquid crystal layer interposed therebetween wherein the liquid crystal layer exhibits a plurality of display states; a display state is changed by a voltage applied across the electrodes, and at least one state among the display states is maintained stably, the liquid crystal display element being characterized in that at least a part of the front side electrode and the front side substrate is transparent; the front side electrode or the rear side electrode is divided into a plurality of electrode regions on its substrate surface; an antiferroelectric liquid crystal is used for the liquid crystal layer, and the maximum space  $a$  ( $\mu\text{m}$ ) between adjacent

electrode regions, the thickness  $d$  ( $\mu\text{m}$ ) of the liquid crystal layer, and the maximum voltage  $V_{OP}$  (V) of a voltage applied to the front side electrode and the rear side electrode satisfy a relational formula of  $1.0 \cdot d \leq a \leq d \cdot V_{OP}/40$ .

Claim 16. (Withdrawn) The liquid crystal display element according to Claim 15, wherein  $V_{OP}$  is 120 V or less and  $0.5\mu\text{m} \leq d \leq 6.0\mu\text{m}$ .

Claim 17. (Withdrawn) The liquid crystal display element according to Claim 15, wherein at least a part of the front side electrode comprises a plurality of segment electrodes, and the rear side electrode is a common electrode arranged so as to correspond to all the segment electrodes, or the rear side electrode is a common electrode arranged so as to correspond to each plurality of segment electrodes.

Claim 18. (Withdrawn) The liquid crystal display element according to Claim 15, wherein at least a part of the front side electrode is stripe-like electrodes and at least a part of the rear electrode is stripe-like electrodes, said stripe-like electrodes of the front side electrode and the rear side electrode being arranged so as to be crossed in the substrate plane to effect a dot matrix display.

Claim 19. (Withdrawn) The liquid crystal display element according to Claim 17, wherein the rear side electrode is a reflective electrode.

Claim 20. (Withdrawn) The liquid crystal display element according to Claim 18, wherein the rear side electrode is a reflective electrode.

Claim 21. (Withdrawn) A liquid crystal display apparatus wherein the liquid crystal display element described in Claim 15 is used for a display apparatus of a vehicle.

Claim 22. (New) A liquid crystal display element, comprising:

a front side substrate having a front side electrode,

a rear side substrate having a rear side electrode, and

a liquid crystal layer interposed therebetween,

wherein the liquid crystal layer is a chiral nematic liquid crystal layer comprising

a nematic liquid crystal, and

an amount of chiral dopant sufficient to provide reflection of visible light, and

wherein the liquid crystal layer exhibits a plurality of display states;

wherein a display state is changed by a voltage applied across the electrodes, and at

least one state among the display states is maintained stably,

wherein at least a part of the front side electrode and the front side substrate is transparent;

wherein the front side electrode or the rear side electrode is divided into a plurality of electrode regions on its substrate surface so as to form pixel portions and interline portions,

wherein the maximum space  $a$  ( $\mu\text{m}$ ) between adjacent electrode regions and the thickness  $d$  ( $\mu\text{m}$ ) of the liquid crystal layer satisfy a relational formula of  $1.0 \cdot d < a < 4.0 \cdot d$ , so that the alignment of the liquid crystal in said interline portions is restored from a planar state to a focal conic state.

Claim 23. (New) A liquid crystal display element, comprising:

a front side substrate having a front side electrode,  
a rear side substrate having a rear side electrode, and  
a liquid crystal layer interposed therebetween,  
wherein the liquid crystal layer is a chiral nematic liquid crystal layer comprising  
a nematic liquid crystal, and  
an amount of chiral dopant sufficient to provide reflection of visible light, and  
wherein the liquid crystal layer exhibits a plurality of display states;  
wherein a display state is changed by a voltage applied across the electrodes, and  
wherein at least one state among the display states is maintained stably,  
wherein at least a part of the front side electrode and the front side substrate is  
transparent;  
wherein the front side electrode or the rear side electrode is divided into a plurality of  
electrode regions on its substrate surface so as to form pixel portions and interline portions,  
wherein the maximum space  $a$  ( $\mu\text{m}$ ) between adjacent electrode regions, the thickness  
 $d$  ( $\mu\text{m}$ ) of the liquid crystal layer, and the maximum effective voltage  $V_{\text{max}}$  (V) of a voltage  
applied to the front side electrode and the rear side electrode satisfy a relational formula of  
 $1.0 \cdot d < a < d \cdot V_{\text{max}}/10$ , so that the alignment of the liquid crystal in said interline portions is  
restored from a planar state to a focal conic state.



**BASIS FOR THE AMENDMENT**

New Claims 22 and 23 have been added as supported at pages 13-17 of the specification and by Claims 1 and 2, respectively.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 1-23 will now be active in this application. Claims 1-3, 5, 6, 8, 10 and 22-23 are under consideration. Claims 4, 7, 9 and 11-21 stand withdrawn from consideration as being drawn to non-elected subject matter.